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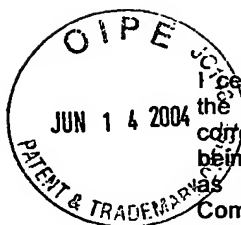
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**PATENT**



I certify that on 6/9/04, which is the date I am signing this certificate, this correspondence and all attachments mentioned are being deposited in the United States Postal Service as first class in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Craig A. Slavin  
Craig A. Slavin

**Applicant:** Bullock

**Serial No.:** 10/000,248

**Filing Date:** October 29, 2001

**Title:** Replaceable Fuel Cell Apparatus  
Having Information Storage Device

**Group Art Unit:** 1745

**Examiner:** Maples

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**DECLARATION OF MICHAEL L. BULLOCK UNDER**

**37 C.F.R. § 1.131**

Sir:

I, Michael L. Bullock, declare that:

1. I am a co-inventor named in U.S. application Serial No. 10/000,248 ("the application"). The other co-inventor named in the application is Winthrop D. Childers.
2. Winthrop D. Childers and I conceived of the inventions defined by claims 1, 2, 8, 10-14 and 16 of the application ("the inventions") prior to July 25, 2001.
3. Prior to July 25, 2001, Winthrop D. Childers and I illustrated and described exemplary embodiments of the inventions in the document entitled *Information Storage Device Used On Replaceable Fuel Cartridge* ("the Fuel Cartridge document"), which attached hereto as Exhibit 1. The Fuel Cartridge document is dated prior to July 25, 2001.
4. The exemplary fuel cartridge illustrated and described in the Fuel Cartridge document includes a fuel reservoir, an information storage device, and an information storage device link. The information storage device link, which is connected to the information storage device, is configured to be connected to processor in a host device by a corresponding link.
5. Winthrop D. Childers and I prepared an Invention Disclosure form prior to July 25, 2001, which is attached hereto as Exhibit 2. The Invention Disclosure form

describes the inventions. The Fuel Cartridge document was attached to the Invention Disclosure form.

6. The Invention Disclosure form, with the Fuel Cartridge document, was transmitted to the Hewlett-Packard legal department prior to July 25, 2001.

7. On information and belief, Winthrop D. Childers and I reviewed the final version of the application and, on or before September 6, 2001, Winthrop D. Childers advised the attorney drafting the application that the application was ready to be filed.

8. I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Respectfully submitted,

6/1/04  
Date

  
Michael L. Bullock

## Information storage device used on replaceable fuel cartridge

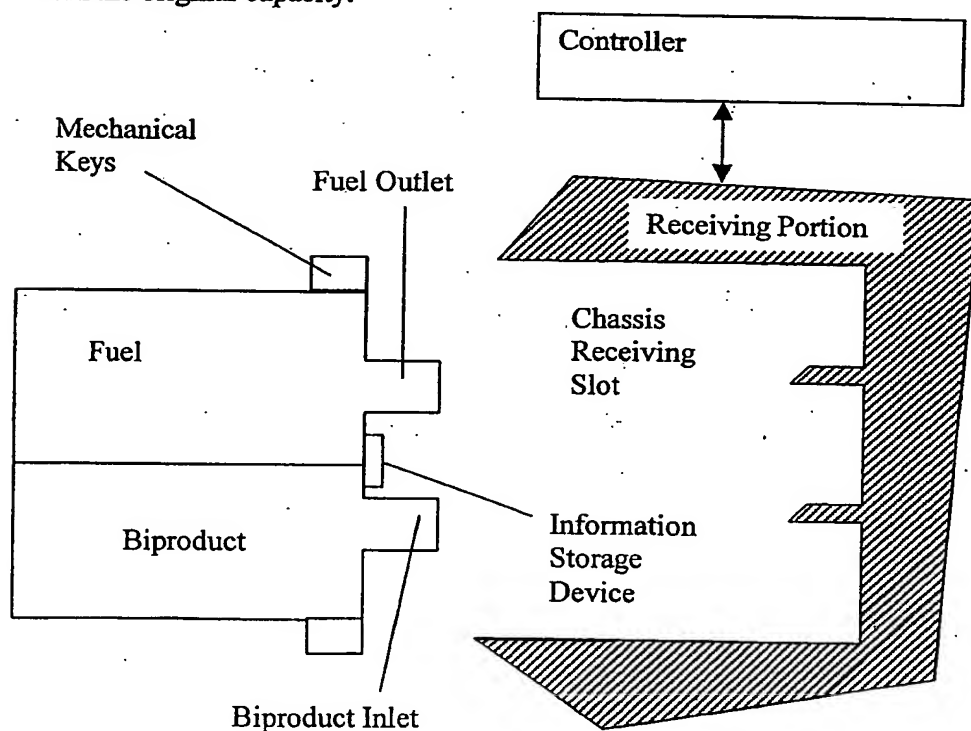
Win Childers  
Mike Bullock

**Abstract:** A fuel cell includes a fuel cartridge and a receiving portion. The fuel cartridge has an information storage device that communicates through the receiving portion. The information storage device contains information that represents the volume of fuel of the cartridge and the fuel remaining.

### Description of Invention:

In general, a compact fuel cell power supply system may be implemented into variety of products, including laptop computers, e-books, palmtop computers, calculators, cellular phones, and other portable electronic devices. The present invention concerns a way of making a very low cost two-chamber fuel/biprodut cartridge having a way of keeping track of the fuel remaining in the cartridge. The cartridge can be removed and the fuel remaining information would be preserved on the cartridge via the information storage device. The cartridge could be used in another system and the fuel remaining could be communicated to the user.

The fuel cell of the present invention includes a fuel cartridge and a receiving portion. The fuel cartridge includes an information storage device such as an electronic memory chip. The information stored on the device can consist of the initial capacity or volume of fuel. In addition, there would be a portion of the storage elements dedicated to keeping track of the volume remaining. The controller in the fuel cell or the system that the fuel cell is connected to would keep track of the fuel used by various sensing methods such as energy via current and voltage sensors. The energy usage could then be transformed into volume of fuel and subtracted from the original capacity.



### Specific Embodiment

One preferred embodiment would be to use a serial EEPROM memory chip that is connected electrically or through RF links to the controller. On that chip would be data fields that store the original volume of fuel that the cartridge is filled with. Another data field would be composed of 8 bits (called the coarse bits), each represents 1/8 of the original capacity. A third data field would represent the fine bits, this field representing 100% of one of the coarse bits. By decrementing these fields as the energy is consumed, the memory chip would be able to keep track of the fuel remaining. The EEPROM is non-volatile and can retain the information without power being applied.

### Data Field Examples


1. **Initial fuel level** – indicative of the initial energy (or “charge”) contained in the fuel cartridge.
2. **Current fuel level** – indicative of the amount of energy remaining or that has been consumed in the fuel cell.
3. **Low fuel level warning threshold** – when the fuel cell would provide a warning to the user of a low fuel condition.
4. **Type of fuel contained** – what the “grade” of fuel is, or the maximum power extractable from the fuel cartridge to allow a controller associated with the fuel cell to determine how much power can be provided at a given voltage level. (See keying case also)
5. **Header Info** – Such as data organization that tells the device where to look for certain data fields.
6. **Maximum power rating**
7. **Safety Factor** – For example, if the fuel cell is to be taken on an airplane (laptop application), then the fuel may need to have some diluent or meet level of safety margin that might not be required for another application. Any cartridge not having the proper safety factor would be rejected – the fuel cell would not operate with it and may set off an alarm.

### System and Exemplary Product – A combination PDA/cell phone

The system envisioned could be a laptop computer, an e-book, PDA, cell phone, etc. The system will include a display (such as an LCD display) that can provide various messages to the user such as energy remaining (like a gas gauge), suitability of the fuel cartridge, etc. Now, consider the example where the device is a combination PDA/cell phone that includes a color LCD display. The receiving portion of the fuel cell is integrated into an edge of the PDA cell phone to allow easy installation of the fuel cartridge into the PDA/cell phone. The following is the usage sequence:

1. User attempts to install fuel cartridge into a combination PDA/cell phone called the “device” from here forward. If the fuel is severely incompatible, a mechanical feature on the fuel cartridge prevents installation. Otherwise, the cartridge is installed and we move to step 2.
2. The device electronics reads a data header relating to the data organization. Based upon this, the device electronics “knows” where certain data resides in the memory.
3. The device reads parameters indicative of the family ID, model number, power rating, grade of fuel, and/or safety factor of the fuel cartridge to make sure the fuel cartridge is compatible with the device requirements. If the cartridge is not compatible for the all criteria such as required power levels and operational safety standards, then an alarm will be displayed and/or sounded audibly or vibratorily, and the fuel cell will not provide power. Otherwise, the device can be operated.

4. The device electronics reads the initial fuel level and performs a calculation relating device operation to an incremental percentage of the initial fuel level.
5. During operation of the device, the display indicates the remaining energy level of the cartridge based upon the calculation done in step 3. An audible or vibratory warning occurs at a "low fuel" level, allow the user time to acquire another fuel cartridge.

	<b>INVENTION DISCLOSURE</b> (WKRP Document No. 20001215.101223)			<b>Done Printing Document</b>
	PD Number:	Date Received by Legal		Managing Attorney:
	10011103	Invention Disclosure status: Submitted 28% complete		DGS/JSS
<b>General Information   Invention History   Description of Invention   Inventor Information  </b> <b>Witness Information   Additional Information   Administrative Record</b>				

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<b>General Information</b> Section Complete
<b>Title:</b> Write a descriptive title of the invention.
<i>Replaceable Fuel Cartridge for a Fuel Cell Having An Integral Information Storage Device</i>
<b>Abstract:</b> Write a brief abstract of the invention.
<i>A fuel cell includes a fuel cartridge and a receiving portion. The fuel cartridge has an information storage device that communicates through the receiving portion. The information storage device contains information that represents the volume of fuel of the cartridge and the fuel remaining.</i>
<b>Projects:</b> Select projects associated with disclosed invention.
<i>Fuel Cells</i>
<b>Products:</b> Select product names or numbers associated with this invention.
<i>none</i>

<b>Invention History</b> Section Complete
<b>Published:</b> Was a description of the invention published, or are you planning to publish? If so, when and in what publications?
<i>No</i>
<b>Announced:</b> Was a product including the invention announced, offered for sale, sold, or is such activity proposed? If so, when and where?
<i>No</i>
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<i>No</i>
<b>Urgency:</b> Will the invention be published, announced, or disclosed in the next 3 months?
<i>No</i>
<b>Described:</b> Was the invention described in a lab book or other record?
<i>No</i>
<b>Built:</b> Was the invention built, modeled, or tested? If so, when?
<i>No</i>
<b>Government Contract:</b> Was the invention made under a government contract?

If so, the agency and contract number:

No

## Description of Invention

Section Complete

**Prior Solutions:** List prior solutions and their disadvantages.

*The idea of a fuel cell power generator having a replaceable fuel module is not new, but there are various issues -- how does one know that the proper fuel module is installed? how does one track how much fuel remains? how do you know that the replaceable cartridge is properly installed?*

**Problems Solved:** Explain the problems solved by the invention.

*What is provided for a fuel cell that is configured to receive a fuel cartridge is a way of:*

- (1) determining that the fuel cartridge is installed.*
- (2) determining that the fuel cartridge is appropriate for the application*
- (3) determining the remaining fuel level and communicating this information to the user of an electronic device that utilizes the fuel cell*

**Advantages:** What are the advantages of the invention over what has been done before?

- (1) Ease of use for the customer -- the customer knows how much fuel remains and can receive a low fuel warning.*
- (2) Reliability -- the system will not "try" to operate without a properly installed fuel cartridge*
- (3) Performance -- the system can adapt operation according to parameters stored on the information storage device.*

**Description:** Describe the construction and operation of the invention.

*See attached file.*

## Inventor Information

Section Complete

**Inventor(s):** Pursuant to my (our) employment agreement, I (we) submit this disclosure:

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**Inventor Home Addresses:** Enter the home address of each Inventor. This information is legally required to process your Invention Disclosure.

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Childers, Winthrop D	17015 Oculito Ct.	San Diego	CA	92127	[U.S.A.]

**Inventor Citizenships:** Select the country of citizenship for each Inventor.

Inventors

Bullock, Michael L

Country of Citizenship

[U.S.A.]



Childers, Winthrop D		[U.S.A.]
<b>Inventor Mail Stops:</b> Enter the HP Mail Stop for each Inventor.		
<b>Inventors</b>		<b>HP Mail Stop</b>
Bullock, Michael L		61U66
Childers, Winthrop D		61U66
<b>Non-HP Inventors:</b> Please list the names, home addresses, telephone numbers, email addresses, and countries of citizenship of inventors who are not affiliated with HP.		

<b>Witness Information</b> Section Complete		
<b>Witnesses:</b> This invention has been explained to and understood by the following witnesses.		
Di Ricco, Rebecca [00256262] San Diego, CA, USA	Telnet: 655-3368 Location Code: 111N-5196	rebecca_diricco@am.exch.hp.com Added by Childers, Winthrop D on [REDACTED]
Lebron, Hector [00458677] San Diego, CA, USA	Telnet: 655-3238 Location Code: 111N-5196	hector_lebron@am.exch.hp.com Added by Childers, Winthrop D on [REDACTED]
<b>Witness Dates:</b> At what date was this invention first explained to and understood by each witness?		
<b>Witnesses</b>		<b>Date Understood</b>
Di Ricco, Rebecca		[REDACTED]
Lebron, Hector		[REDACTED]

<b>Additional Information</b> Section Complete			
<b>Electronic Documents:</b> Do you have electronic document files to upload?			
<b>File Name</b> Click to View cart_mem.doc	<b>Size</b> Bytes 31744	<b>Uploaded</b> [REDACTED]	<b>Uploaded By</b> User Childers, Winthrop D
<b>Paper Documents:</b> Do you have paper documents to include with your Invention Disclosure that you would like to send by FAX?			
<b>Categories:</b> Select WKRP categories where this invention disclosure should be indexed.			
Fuel Cells			
<b>Keyword(s):</b> Select keywords to index this invention disclosure.			
Fuel Cells			
<b>Invention Workshop:</b> Was this Invention Disclosure prepared as a result of an Invention Workshop? If you are not sure, select No.			
No			

<b>Administrative Record</b> 5 Required Fields Remaining		
<b>Legal Admin:</b> Select the name of the Legal Admin(s) working on this Invention Disclosure:		
Lygas, Ann [00515615] San Diego, CA, USA	Telnet: 655-4926 Location Code: 0000-1622	ann_lygas@am.exch.hp.com Added by Lygas, Ann on [REDACTED]
<b>PD Number and Legal Received Date:</b> Record the PD number assigned by Merlin and modify the date this disclosure was received, if necessary. [REDACTED]		
<b>Patent Coordinator(s):</b> Select Patent Coordinator(s) who will work on this Invention Disclosure:		
<b>Managing Attorney(s):</b> Select Managing Attorney(s) assigned to this Invention Disclosure:		
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